Space Weather Forecast

Issued on Monday, 31 July 2023 at 01:12 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: R1-R2 Blackouts likely throughout. G1-G2 Minor/Moderate storms possible 01 Aug with CME arrival.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with one Moderate-class flare, peaking at 30/0822 UTC (a double peaked flare) from a region in the southeast. This is a small and unremarkable region, although there is the possibility of hidden complexity due to its oblique viewing angle. A moderately sized region in the southwest has continued to grow, developing into a more compact region with mature penumbra across a number of spots, but with a relatively simple magnetic structure. Another moderately sized region east of north centre disc continues to show some magnetic complexity within the intermediate spots. The other regions remain largely small and simple at the present time.

No new Earth-directed Coronal Mass Ejections (CMEs) have been observed in the last 24 hours.

Solar Wind / Geomagnetic Activity: The solar wind showed the onset of a coronal hole fast wind, although the coronal hole is largely obscured in imagery. Wind speeds increased to reach a peak of around 530 km/s, before easing slightly. They are now around 480 km/s. The total interplanetary magnetic field was mostly weak. The north-south component was initially weakly northward directed, but became mostly weakly southward directed after 30/0230 UTC. Geomagnetic activity was Quiet.

Energetic Particles / Solar Radiation: The observed count rate of energetic particles (high energy protons) was initially above the S1/Minor Radiation storm level but declined below the S1 threshold around 30/1630 UTC, after the enhancement to S2/Moderate Storm levels earlier on 29 Jul.

Four-Day Space Weather Forecast Summary

Solar Activity: Activity is likely to remain Moderate with further Moderate-class flares, these most likely from the two larger regions on the disc. An increase is suggested later in the period, with the possible return of a previously active region indicated from far side data.

Solar Wind / Geomagnetic Activity: The CME which left the Sun on 29 Jul is currently forecast to arrive at 01/1000 UTC +/- 9 hours. Solar winds are currently enhanced, likely due to the arrival of a coronal hole fast wind. Elevated winds have started to ease and are likely to ease further, perhaps to background levels, before the CME arrival. Another coronal hole fast wind may give an enhancement towards the end of Day 4 (03 Aug), but this is perhaps more likely after the end of this period.

Geomagnetic activity is expected to be Quiet to Unsettled at first. The CME arrival, most likely early on Day 2 (01 Aug), is expected to give Active to G1/Minor Storm conditions with a chance of G2/Moderate Storm intervals. These conditions gradually easing through Day 3 (02 Aug) to become mostly Quiet, perhaps with some Unsettled to Active intervals later on Day 4 should the fast wind arrive.

Energetic Particles / Solar Radiation: The count rate of energetic particles is now below below the S1/Minor Storm level, and is likely to continue easing to background levels. The CME arrival on Day 2 (01 Aug) may give another brief enhancement close to, or just above the S1 level before easing to background. There is a slight chance of further enhancements from any larger flares that occur.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	60	20	5
Strong	G3	No	5	10	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	70	70
Very Active	R3 to R5 X	No	5	5	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	10	20	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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